

## **REMARKS/ARGUMENTS**

Applicants respond herein to the Office Action dated March 23, 2005.

It is acknowledged with appreciation that the Examiner has withdrawn the restriction requirement set forth in a previous Office Action dated December 14, 2004. Applicants would also like to thank the Examiner for considering the references submitted with the Information Disclosure Statement filed on September 27, 2004 and February 15, 2005 and for providing Applicants with initialed copies of the PTO-1449 forms submitted therewith.

Claims 3-5 stand rejected on grounds of anticipation by Kuibara et al. (US 2003/0150563). Claim 3 is further rejected on grounds of anticipation by Crocker (US 2001/0050143). Claims 6-8 stand rejected on grounds of obviousness over Kuibara et al. as applied above with respect to claims 3-5. Claims 9-13 stand rejected on grounds of obviousness over Jiang et al. (US 2003/0178474), in view of Kuibara et al. Reconsideration is requested in view of the amendments to the claims herein and the following remarks.

As amended, claim 3 includes the limitations of canceled claim 5 to the effect that the supporting member supports the placement member and an aperture portion of the supporting member is joined in an airtight seal to the placement member. Further, a ceramic thermal insulation material is provided in an inner space of the supporting member such that the inner space is substantially filled with the ceramic thermal insulating material. Support is provided in originally filed claim 5 and in the specification text at page 15, line 24 to page 17, line 1.

Relative to the rejection of independent claim 3 over Kuibara et al. under 35 U.S.C. §102(e), it is noted that the Office Action asserts that this reference discloses a substrate holding structure comprising a placement member having a plasma generating electrode and an electrostatic adhesion electrode. The Office Action continues that a cylindrical body supports the placement member.

Kuibara et al., however, fails to disclose that the ceramic thermal insulation material is provided in an inner space of the supporting member such that the inner space is substantially filled with the ceramic thermal insulation material. Rather, in Kuibara et al., the supporting

member is a cylindrical body having an inner space, and the inner space is hollow. Thus, claim 3 is not obvious over Kuibara et al.

Relative to the rejection of claim 3, on grounds of anticipation by Crocker, it is stated in the Office Action that this reference discloses a substrate processing apparatus comprising a placement member with a substrate placement surface therein. However, Crocker is silent about a substrate processing apparatus having a cylindrical supporting member for supporting in the manner recited in claim 3, much less a ceramic thermal insulation material being provided in an inner space of the supporting member such that the inner space is substantially filled with the ceramic thermal insulating material.

Relative to the rejection of claims 9-13 over Jiang et al., in view of Kuibara et al., it is asserted in the Office Action that Jiang et al. teaches that plasma is generated between the bonding tool and the bonding stage before a substrate and a component are brought together. In fact, Jiang et al. does not disclose that the bonding stage has a plasma generating electrode and an electrostatic adhesion electrode, and that a cylindrical supporting member is attached in an airtight seal, let alone a ceramic thermal insulation material being provided in an inner space of the supporting member such that the inner space is substantially filled with the ceramic thermal insulation material.

The Examiner further observed that the cylindrical supporting member is made of ceramic thermal insulation material, such as aluminum nitride (citing paragraph 0079; Figure 1). However, paragraphs 0007 and 0008 of Kuibara et al. disclose that aluminum nitride is one type of ceramic having excellent thermal conductivity. In addition, a supporting member made of stainless steel is disclosed in paragraph 0012 of Kuibara et al. Those skilled in the art would not have appreciated using aluminum nitride or metals, such as stainless steel, which have excellent thermal conductivity, as an insulating material. Accordingly, it would not have been obvious to those skilled in the art to fill the inner space of the supporting member with a ceramic, of the type recited in the instant claims, as an insulating material. In the bonding stage of the currently amended claim 3, since ceramic thermal insulation material is provided in an inner space of the supporting member so that the inner space of the supporting member is substantially filled with the ceramic thermal insulation material, the placement member has sufficient resistance, even if

compression bonding pressure is applied repeatedly to the placement member in a bonding process, as discussed at lines 4-9 on page 6 of the specification of the present application. As a result, damage to the placement base and the supporting member is prevented and, furthermore, the placement surface has excellent heat equalizing properties.

In view of the foregoing remarks, the Applicants submit that none of the cited references, either taken alone or in any combination thereof, teach a ceramic thermal insulation material that is provided in an inner space of the supporting member such that the inner space is substantially filled with the ceramic thermal insulation material. Therefore, claim 3 is patentably distinct from the cited references.

With reference to dependent claim 4, it is noted that the placement member is further recited to be provided with a heater electrode. With this structure, it is possible to heat a plate-shaped sample placed on the placement surface to a desired temperature. Accordingly, the Applicants submit that the subject matter of claim 4 is novel and is not obvious to those skilled in the art since the subject matter of the currently amended claim 3 is novel and claim 4, which depends from claim 3, is even more distant from the prior art and, therefore, is not obvious to those skilled in the art.

According to claim 6, the ceramic thermal insulation material is an  $\text{Al}_2\text{O}_3$  -  $\text{SiO}_2$  -  $\text{CaO}$  -  $\text{Li}_2\text{O}$  based ceramic thermal insulation material in the placement member of the currently amended claim 3. With this structure, because this thermal insulation material has excellent compression resistance and thermal insulation properties, as described above, the placement member has more satisfactory resistance to repeatedly applied compression bonding pressure. Moreover, the placement surface is thereby imparted with even better heat equalizing properties. Accordingly, the Applicants submit that the subject matter of claim 6 is novel and is not obvious to those skilled in the art since the subject matter of the currently amended claim 3 is novel and claim 6 is even further distanced from the prior art and, therefore, not obvious to those skilled in the art.

According to claim 7, the supporting member is formed from stainless steel or an Fe-Ni-Co based alloy in the placement member of the currently amended claim 3. With this structure, because Fe-Ni-Co base alloys have excellent heat resistance, plasma resistance, mechanical

strength and the like, the durability of the bonding stage is improved. For the reasons stated above, Applicants, therefore, submit that the subject matter of claim 7, which is dependent on claim 3 and even further distanced from the prior art, is novel and not obvious to those skilled in the art.

According to claim 8, the placement member is joined to the supporting member via an O-ring or a metal gasket in the placement member of the currently amended claim 3. Because it is possible, using the above described bonding stage to perform a packaging process with the bumps at a low temperature that is lower than the melting point of the bumps, the placement member can be joined to the supporting member using a common O-ring or metal gasket without having to rely on a bonding method that has excellent heat resistance. The joining can be achieved at a lower cost and more easily than when a bonding method that has excellent heat resistance is used. Furthermore, manufacturing and maintenance (for example, exchanging the placement member) for the bonding state of claim 8 can be carried out more easily than for the substrate holding structure of Kuibara et al. Accordingly, the Applicants submit that the subject matter of claim 8, which includes the limitations of claim 3 and is even further distanced from the prior art, is not obvious to those skilled in the art and, therefore, claim 8 is novel and not obvious to those skilled in the art.

With respect to claim 9, it is noted that the electronic component packaging apparatus of claim 9 has the bonding stage of claim 3, and since it further provides that the ceramic thermal insulation material is provided in an inner space of the supporting member so that the inner space of the supporting member is substantially filled with the ceramic thermal insulation material, the placement member has sufficient resistance even if compression bonding pressure is applied repeatedly to the placement member in a bonding process. As a result, damage to the placement base and the supporting member is prevented and, furthermore, the placement surface has excellent heat equalizing properties. Accordingly, the Applicants submit that the subject matter of claim 9, which incorporates the limitations of claim 3 and impose further limitations thereon, is not obvious to one of ordinary skill in the art and is, therefore, patentable.

Turning to claim 10, the bonding tool is provided with an electrostatic adhesion mechanism that electrostatically holds the substrate or the electronic component in the electronic

component packaging apparatus of claim 9. With this structure, the substrate and the electronic component can be held and fixed in position on the placement member even more stably by the electrostatic adhesion mechanism. Accordingly, the Applicants submit that the subject matter of claim 10 is novel and not obvious to those of ordinary skill in the art since the subject matter of the currently amended claim 9 is novel and is not obvious to those skilled in the art.

According to claim 11, the bonding tool of claim 9 is provided with at least a plasma generating electrode and a heater electrode. With this structure, it is possible, particularly when a plasma generating electrode is provided, to generate plasma even more stably. Moreover, it is possible, particularly when a heater electrode is provided, to heat the bumps efficiently to a predetermined temperature in a short period of time. Accordingly, the Applicants submit that the subject matter of claim 11, which incorporates the limitations of independent claim 9, is novel and not obvious to those of ordinary skill in the art.

According to claim 12, the bonding tool of claim 9 is further limited by being provided with a pressure application mechanism that applies pressure to the bonding tool. With this structure, it is possible to apply a predetermined pressure to the bonding tool using the pressure application mechanism. Accordingly, the substrate and the electrical component can be reliably bonded, making it possible to perform packaging that provides a high yield and a high level of reliability. Accordingly, the Applicants submit that the subject matter of claim 12, which incorporates the subject matter of independent claim 9, is novel and is not obvious to those of ordinary skill in the art.

According to claim 13, the bonding tool is further provided with an ultrasonic device that emits ultrasonic waves. With this structure, an oxide layer on the surface of the bumps is removed by the action of the ultrasonic waves. By exposing non-oxidized surfaces of the bumps, the compression bonding can be performed more reliably and more satisfactorily. Accordingly, it is possible to improve the bonding efficiency. Therefore, the Applicants submit that the subject matter of claim 13, which includes the limitations of independent claim 9, is not obvious to those of ordinary skill in the art.

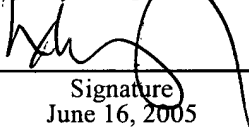
In view of the foregoing remarks, the Applicants submit that they have fully responded to all of the rejections of record and have conclusively demonstrated the non-obviousness and patentability of all of the claims pending in the application.

Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims as amended and pass this case to issue.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 16, 2005:

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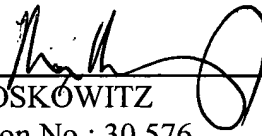


Signature  
June 16, 2005

Date of Signature

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